Division's May Exhibit 18

APPENDIX D

INITIAL STUDIES OF ALLUVIAL VALLEY FLOORS, USING PUBLISHED AND READILY COLLECTED DATA

As described in chapter II, regional appraisals of agricultural use of water in stream valleys, in conjunction with readily collected field data, can be used to make initial determinations of alluvial valley floor status. Use of this kind of data is desirable because many operators, as well as land management agencies, would like to know about the existence of alluvial valley floors as early in the leasing or mine-development process as possible. Also, in an effort to decrease the amount of baseline data collected at a minesite while still achieving the same regulatory objective, it is anticipated that initial studies of alluvial valley floor status will be sufficient for identificaton purposes in permit applications, unless the applicant chooses to collect additional data which clarify the regional pattern.

The following example discusses alluvial valley floor identification in a portion of Kane County, Utah, and illustrates the use of regional agricultural data in making initial determinations.

Regional Setting

This regional identification study (Schmidt, 1980) conducted for the U.S. Office of Surface Mining, Region V, provides an instructive case study because the project was conducted in an area where no previous alluvial valley floor mapping had been done. Some of the

notions about alluvial valley floors in the Powder River Basin are not applicable in this portion of the Colorado Plateau. Therefore, it was necessary to examine the basic role of valleys in the agricultural land use pattern before identification could begin. The process described may therefore be instructive to applicants in coal regions outside the Powder River Basin.

The evaluated area is located in Kane County, Utah, between Bryce Canyon National Park and the Arizona State line. (fig. D-1). The region was studied because some areas had been petitioned by several national conservation groups as being unsuitable for coal mining. The area was informally known as the Alton unsuitability petition area.

The region is dominated by plateaus, cliffs, and canyons and consists mostly of carved tabular relief (fig. B-9). The regional structure and topography are fairly simple, with rock units dipping to the north and revealed as a series of platforms at various altitudes, each bordered by great cliffs. The study area extended from the Paunsagunt Plateau, above 9,500 feet in elavation, to the Kanab Plateau, at about 5,000 feet. This spectacularly scenic area contrasts with the relatively subdued relief of the Fort Union and Powder River Basin coal regions.

The climate of the study area ranges from arid to semiarid, and cool to warm, depending on elevation. At 7,000 feet, mean annual

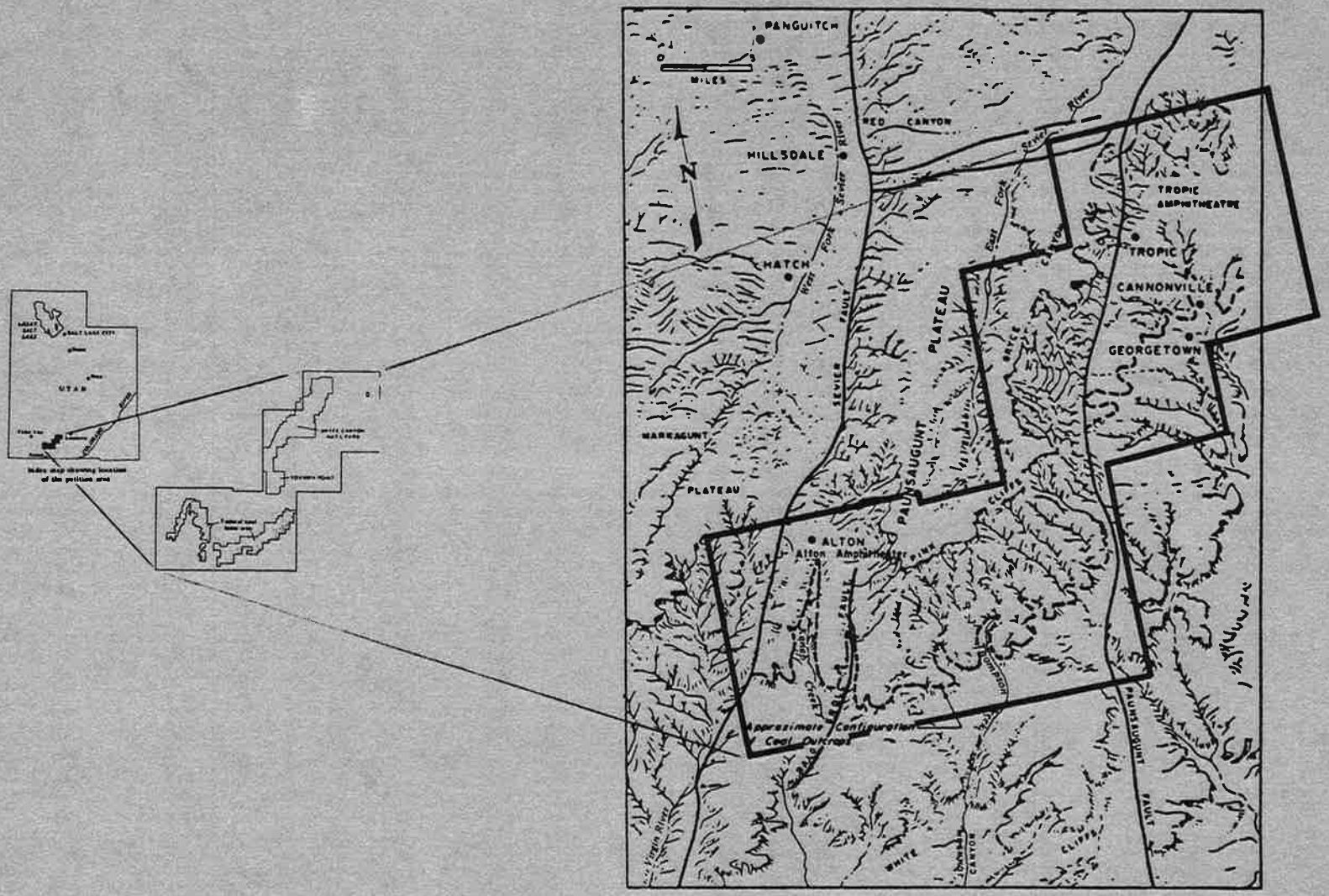

Fig. D-1 Map of southern Utah petition area, showing physiography (OSM, 1980).

precipitation is about 16 inches, whereas at 5,000 feet, mean annual precipitation is about 12.5 inches. The range in the frost-free growing season also reflects elevation differences, from 112 days at 7,000 feet to over 140 days at 5,000 feet.

The season of least rainfall, April to June, is the major growing season in the region. Therefore, farming is not a profitable enterprise without irrigation. Until the advent of ground-water development in the past 10 years, surface water was the sole source of irrigation water. Valleys have been developed because of favorable soils and proximity to water. Agriculture in the region could not exist in its present form without the valleys; therefore, alluvial valleys do exist in the region.

Valleys in the study area are generally entrenched, often as much as 40 feet. Subirrigated meadows are limited and are usually located close to bedrock springs (fig. D-2). Prior to entrenchment of the valleys, subirrigated meadows existed along many of the stream courses, but ground water was drained from these areas when gullying began. Sagebrush is the dominant vegetation on the valley flats, and, although contributing somewhat more forage than the upland pinyon-juniper vegetation, sagebrush areas are not considered especially productive land for grazing.

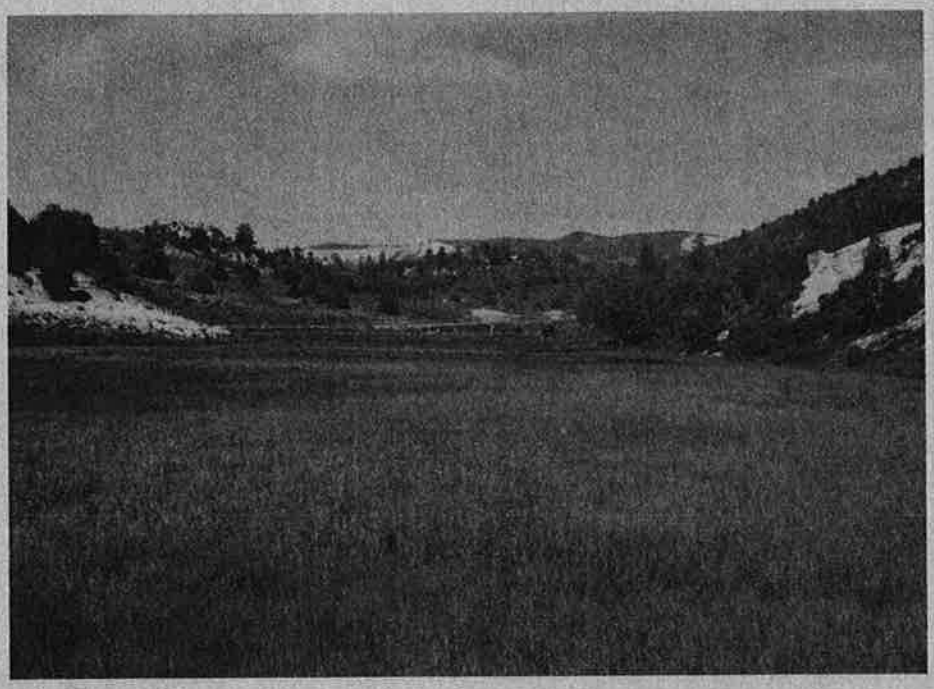

Fig. D-2 Headwaters of stream draining Pink Cliffs, Kane County, Utah. This designated alluvial valley floor has subirrigated native grasses.

Agricultural Use Survey and Identification Process

Initial reconnaissance of the area did not reveal an apparent pattern to irrigation use of the stream valleys. Depth of incision did not seem to affect use, and some deeply entrenched valleys were extensively irrigated. The geologic criteria of an alluvial valley floor was not a sufficient basis on which to make determinations, because all valleys, developed and undeveloped, met those criteria. Further investigation was needed to understand water availability in the region and how agriculturalists had developed the area.

The first step in the identificaton process was to map all irrigated lands in the area. Data were obtained from the Utah State Engineer's Office on water rights filings for the area (1974, Proposed determination of water rights in Colorado River drainage area) and the U.S. Agricultural Stabilization and Conservancy Service (maps of farms, crops, fields, and water developments). Interviews were held with personnel of the ASCS, the Soil Conservation Service (SCS), and Bureau of Land Mangement (BLM). In the field, interviews were held with many ranchers and farmers regarding specific developments and the history of water use in the area.

In the timeframe of the project, color infrared photography could not be obtained; however, black and white photos (scale 1:18,500) were borrowed from the SCS. Based on the interviews and interpretation of photos, and field inspection, maps were made of irrigated land, points of diversions, and structures, such as ditches.

All available data were also collected on subirrigated land. These lands are limited in their extent. Maps and interviews held with BLM and SCS personnel were very helpful in identifying these areas. Most stream channel areas are not subirrigated, and the limited occurrence of subirrigated lands is in contrast to their more extensive occurrence in the Northern Great Plains.

The next task was to interpret these data in terms of regional environmental characteristics. All available data on geology, water resources, soils, and vegetation were collected. These studies included soil surveys, land management plans, and geologic and hydrologic appraisals by the U.S. Geological Survey and Utah Bureau of Mines.

On the basis of these data and field observations, a pattern of agricultural use in selected valleys was identified. Virtually all irrigation development in the area is on the larger, but not necessarily perennial, streams. These streams head in the cliffs of the Paunsagunt Plateau, where springs emerge. This area also experiences the most prolonged snowmelt period, which may last into early summer. Irrigation in these valleys takes place where the valleys are wide enough to develop, and points of diversion are located upstream wherever necessary to get water to the areas to be developed.

Waterflow decreases downstream from the high plateaus, even in the absence of irrigation diversion. A pattern of use has developed wherein upper stream reaches are extensively developed. Downstream areas may be less developed, unless (1) a sizeable drainage basins exists, (2) irrigation return seepage is available, or (3) downstream users hold prior water rights.

Aside from designating existing irrigated lands and subirrigated areas in valleys as alluvial valley floors, the central question became the assessment of what valleys have the capability to be irrigated. The present pattern of use is established in water right decrees, however, regulatory determinations of alluvial valley floors are to be based on physical characteristics, not on legal considerations.

Mapped alluvial valley floors have included all valleys whose streams headed in the high plateaus, regardless of whether specific sites were under irrigation. The assumption was made that water could be transported to any terrace level, providing that a part of that level had historically been irrigated. Terrace levels not irrigated by anyone in the region were not mapped as alluvial valley floors, because there was no demonstration of agricultural importance by the regional agricultural community. The upstream limit of designations extended to the area where streams were characteristically diverted.

The most difficult determinations have been related to the status of valleys where the downstream decrease in available water was known. At the reconnaissance level, these areas were still designated alluvial valleys because a quantitative relationship between water availability and irrigation could not be developed. If an applicant wished to propose mining in these areas, however, he would have the discretion of collecting surface water data which might indicate that a site was below the threshold for irrigation development.

This method resulted in the identificaton of numerous stream valleys as not being alluvial valley floors, based on their ephemeral streamflow and the fact that no ranchers in the area irrigated in these valleys (fig. D-3).

Further Considerations

As noted in the chapters II and III, the next stage of identificaiton for a potential applicant would be the collecton of site data, if those data might show that some areas identified as having the capability to be irrigated actually could not be so developed. For instance, water quantity, water quality, or soils data might show that certain areas could not be irrigated, owing to specific physical limitations. If, however, an applicant agreed with the interpretation of the regional pattern, there would be no further detailed investigation needed to identify alluvial valleys.

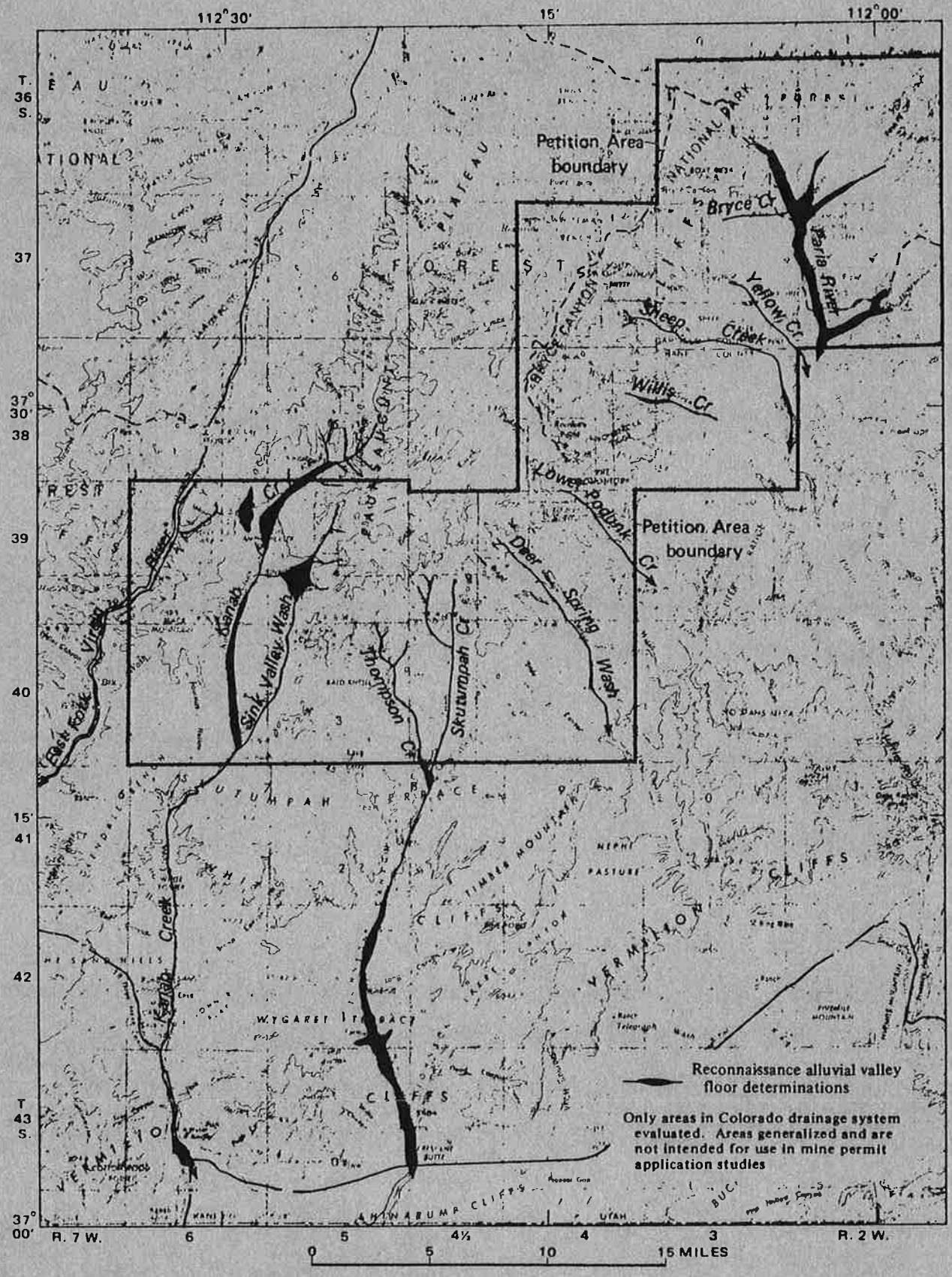

Fig. D-3 Map of the southern Utah petition area, showing identified alluvial valley floors (OSM, 1980).

Identification of alluvial valleys does not imply prohibition from mining. Irrigated areas would have to be evaluated as to the amount of acreage that could be removed from production and still have only a negligible impact on a particular farm's operation. Such assessments would have to consider the specific type of ranching in this part of Utah. Ranchers at the 7,000-foot elevation do not winter any herds in the area, and the production of hay is not for winter use. Instead, cattle are moved every year to lower elevations (particularly in Arizona) for the winter. Hay grown at high elevations is used in the same season or is sold for additional income. Thus, significance evaluations would have to consider lost production in terms of this particular style and economy of agriculture. In a region where winter feed was produced, significance studies often evaluate the effect of lost production on an over-wintering herd. Not so here.

Similarly, evaluations of reclamation feasibility would necessitate more detailed studies of the alluvial valley floors. Virtually all the alluvial valley floors in the Alton unsuitability petition area are irrigated with surface waters. Few areas are subirrigated. Reclamation of surface irrigated lands or lands with the potential to be surface irrigated is substantially less complicated than the reclamation of subirrigated lands.

Bibliography

Schmidt, J. 1980. Reconnaissance determination of alluvial valley floor status and assessment of selected geomorphic parameters in selected stream valleys of the Alton Petition Area and adjoining lands, Garfield and Kane Counties, Utah: Consultant's report to the U.S. Office of Surface Mining, 54 p.

U.S. Department of Interior, Office Of Surface Mining. 1980. Southern Utah Petition Evaluation Document, November. Final 522 SMCRA Evaluation OSM-PE-1 and Environmental Statement OSM-EIS-4. Two volumes.